Air Quality Permitting
Statement of Basis

July 11, 2006

Permit to Construct No. P-060013

Micron Technology, Inc.
Nampa, ID

Facility ID No. 027-00095

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Final

Table of Contents

Acronyms, Units, and Chemical Nomenclatures

acfm	actual cubic feet per minute
AFS	AIRS Facility Subsystem
AIRS	Aerometric Information Retrieval System
AQCR	Air Quality Control Region
Btu	British thermal unit
CAA	Clean Air Act
CFR	Code of Federal Regulations
CO	carbon monoxide
DEQ	Department of Environmental Quality
dscf	dry standard cubic feet
EPA	U.S. Environmental Protection Agency
FEC	facility emissions cap
gpm	gallons per minute
gr	grain (1 lb = 7,000 grains)
HAPs	Hazardous Air Pollutants
IDAPA	a numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act
lb/hr	pound per hour
MMBtu	million British thermal units
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO_2	nitrogen dioxide
NOx	nitrogen oxides
NSPS	New Source Performance Standards
O_3	ozone
PM	particulate matter
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
PSD	Prevention of Significant Deterioration
PTC	permit to construct
PTE	potential to emit
Rules	Rules for the Control of Air Pollution in Idaho
scf	standard cubic feet
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SM	Synthetic Minor
SO_2	sulfur dioxide
SOx	sulfur oxides
TAPs	toxic air pollutants
T/yr	tons per year
$\mu g/m^3$	micrograms per cubic meter
UTM	Universal Transverse Mercator
VOC	volatile organic compound

1. PURPOSE

The purpose for this memorandum is to satisfy the requirements of IDAPA 58.01.01.200, Rules for the Control of Air Pollution in Idaho, for issuing permits to construct. The applicant has also requested a facility emissions cap "FEC" in accordance with IDAPA 58.01.01.175.

2. FACILITY DESCRIPTION

Micron Technology, Inc. (MTI) submitted an application for a proposed semiconductor manufacturing facility and related operations at 1401 N. Kings Rd. Nampa, Idaho. MTI proposes to install semiconductor manufacturing equipment and associated heating, cooling, support operations, and pollution control equipment.

MTI manufactures semiconductor devices (also called chips or die) on silicon wafers.

MTI must constantly adapt to changing product mix, architecture, and functionality. The nature and rapid pace of constant technological change affects the type, number, and configuration of equipment (also known as "tools" in the industry) required to fabricate chips or die. Current plans for the Fab generally include photolithography processes, although in the future, the Fab may perform the other basic processes described in detail below: cleaning, diffusion, wet etch, dry etch, implant, metallization, and assembly.

Effective production of semiconductor products requires utilization of advanced semiconductor manufacturing techniques and effective deployment of these techniques across multiple facilities. MTI is continuously enhancing production processes, reducing die sizes and transitioning to higher density products.

2.1 Manufacturing

The semiconductor fabrication (manufacture) process includes cleaning, diffusion, photolithography, etch, doping, metallization, and assembly.

2.1.1 Cleaning

Silicon wafers are cleaned to remove particles and contaminants such as dust. Aqueous acid or acid mixtures are the most commonly used cleaning solutions. Use of acids is generally necessary because of the solubility characteristics of silicon, silicon oxide, and common contaminants. A variety of acids may be used depending on the nature of the material to be removed.

2.1.2 Diffusion

The next step in the process depends on the type (i.e., imager, flash, DRAM), of integrated circuit device being produced, but commonly involves the diffusion or growth of a layer or layers of silicon dioxide, silicon nitride, or polycrystalline silicon (see Figure 2-1). For example, an initial layer of silicon dioxide with the subsequent deposition of a silicon nitride layer is commonly applied to metal oxide silicon devices. Diffusion processes can be conducted at atmospheric pressure or in a vacuum chamber and are typically conducted at temperatures between 400 and 1200°C. Chemicals and gasses necessary to obtain the desired effect are flowed for a limited time into the chambers where a reaction takes place, depositing a layer of the element or compound on the surface of the wafer. Wafer residence times in the chambers can range from several minutes to twenty-four hours. Several products containing volatile organic compounds (VOC) may be used in the diffusion step depending on the desired composition of the layer. As gases react in the diffusion process, a small amount of particulate matter may be produced and emitted.

Figure 2-1

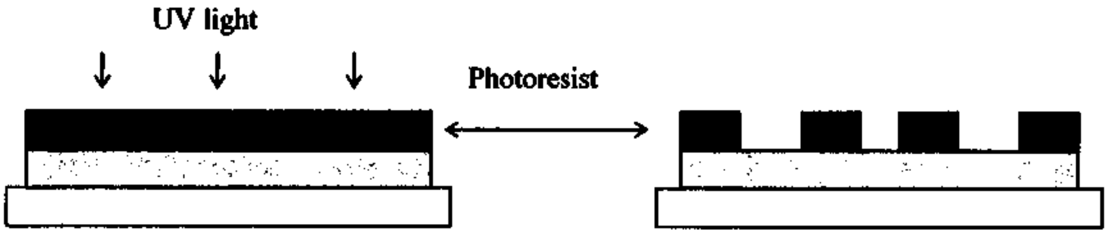
Schematic Representation Of A Wafer After Diffusion

2.1.3 Photolithography

The wafer then proceeds to the photo process. Vapor priming occurs first to remove any moisture present on the surface of the wafer to prepare it for optimum photoresist adhesion. The wafer continues on to coat tracks where it is coated with a photoresist, a photosensitive emulsion, followed by a rinse to remove excess photoresist from the edges and backside of the wafer. The wafer is next exposed to ultraviolet light using glass photomasks that allow the light to strike only selected areas and depolymerize the photoresist in these areas (see Figure 2-2). After exposure to ultraviolet light, exposed photoresist is removed from the wafer on develop tracks and rinsed off with deionized (DI) water. Photo allows subsequent processes to affect only the exposed portions of the wafer. Wafer residence times during chemical application in the photo process can vary from several seconds to ten or fifteen minutes.

Figure 2-2

Schematic Representation Of A Wafer During
And After Photo

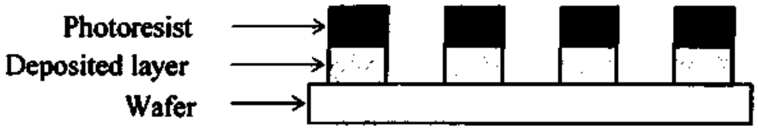


2.1.4 Etch

Etching of the wafer is then conducted to selectively remove deposited layers not protected by the photoresist material (see Figure 2-3). Either dry or wet etch processes may be used depending on the type of layer being removed. Dry etch uses a high energy plasma to remove the target layer. Process gases are ionized under vacuum pressure to form plasmas capable of etching specific layers. Wet etch may also be used to remove specific layers from the wafer. Some wet etch processes, however, also perform cleaning functions and prepare the wafer for subsequent processing. Wet etch is generally conducted at atmospheric pressure. Both etch processes may be conducted at ambient temperature or elevated temperatures (400°C or higher). Chemicals and gases used in both etch processes may be used in varying quantities depending on the specific objective of the etch being conducted. Wafer etching can be conducted for anywhere from two minutes to more than two hours.

Figure 2-3

Schematic Representation Of A Wafer After Etching



2.1.5 Doping (Diffusion and Implant)

Following etch, the wafer moves on to a process where dopants are added to the wafer or layers. Dopants are impurities such as boron, phosphorus, or arsenic. Adding small quantities of these impurities to the wafer substrate alters its electrical properties. Implant and diffusion are two methods currently used to add dopants. During implant a chemical is ionized and accelerated in a beam to velocities approaching the speed of light. Scanning the beam across the wafer surface implants the energized ions into the wafer. A subsequent heating step, termed annealing, is necessary to make the implanted dopants electrically active. Diffusion is a vapor phase process in which the dopant, in the form of a gas, is injected into a furnace containing the wafers. The gaseous compound breaks down into its elemental constituents on the hot wafer surface. Continued heating of the wafer allows diffusion of the dopant into the surface at controlled depths to form the electrical pathways within the wafer (see Figure 2-4). Solid forms of the dopant may also be used.

FIGURE 2-4

SCHEMATIC REPRESENTATION OF A WAFER AFTER IMPLANT

2.1.6 Metallization

Metallization is a process that can be used to add metal layers to a wafer. Sputtering and vacuum deposition are forms of metallization that may be used to deposit a layer of metal on the wafer surface. In the sputtering process the source metal and the target wafer are electrically charged, as the cathode and anode, respectively, in a partially evacuated chamber. The electric field ionizes the gas in the chamber and these ions bombard the source metal cathode, ejecting metal which deposits on the wafer surface. In the vacuum deposition process the source metal is heated in a high vacuum chamber by resistance or electron beam heating to the vaporization temperature. The vaporized metal condenses on the surface of the silicon wafer. Some VOCs may be used in the diffusion process, but are generally not used in the implant or metallization processes.

The wafer is then rinsed in an acid or solvent solution to remove the remainder of the hardened photoresist material. A second oxide layer is grown on the wafer and the process is repeated. This photolithographic-etching-implant-oxide process sequence may occur a number of times depending upon the application of the semiconductor. During these processes the wafer may be cleaned many times in acid solutions followed by DI water rinses and solvent drying. This is necessary to maintain wafer cleanliness. The rinsing and drying steps may involve the use of a VOC-containing material. The wafer-fabrication phase of manufacture ends with an electrical test (probe). Each die on the wafer is probed to determine whether it functions correctly. Defective die are marked to indicate they should be discarded. A computer-controlled testing machine quickly tests each circuit.

2.1.7 Wafer-Level Packaging

Rather than being assembled into protective packages as described above, some semiconductor chips are processed further at the wafer level. Front-end wafer-level packaging consists of extending the wafer fab process to include device inter-connection and device protection processes prior to final assembly. Back-end wafer level packaging processes are described in the assembly section.

2.1.8 Assembly

After the fabrication processes are completed, most semiconductor chips are assembled into protective packages. The wafers are first mounted on tape in a metal frame where the wafer is sectioned by a wafer saw to separate the individual chips or die. Die are picked off the tape and attached to the bonding pad of a leadframe. Die attach cure ovens heat treat the die/leadframe assembly for several hours. The die is then connected to the legs of the leadframe by fine bonding wire. A protective coating is applied to the die and hardened in die coat cure ovens. The entire die is then encapsulated with a protective molding compound. The leadframe strip is trimmed and individual die leads formed. The legs of individual die packages are then plated to provide reliable electrical contacts. Individual die may then be sold as die or assembled further into modules. Several VOC-containing materials are used in the assembly process.

The primary difference between the assembly process described above and back-end wafer level packaging is that the thin conductive wire and the leadframe are eliminated and replaced by metal balls that allow the chip to be attached directly to the electronic device.

2.2 Support Operations

Numerous operations are conducted at the facility in support of the manufacturing process. These include:

- natural gas boilers used to supply steam for general heating and humidification;
- cooling towers used to dissipate heat with non-contact cooling water;
- temporary storage of solid and liquid hazardous waste and secondary materials generated at the facility pending shipment to a licensed off-site treatment, storage, and disposal facility or for lawful reuse or other recycling;
- storage of diesel fuels;
- painting and welding in support of new construction and maintenance of existing equipment and facilities;
- maintenance of surfaces in production areas by general cleaning activities; and
- emergency equipment.

3. FACILITY / AREA CLASSIFICATION

MTI is classified as a synthetic minor facility because MTI's potential to emit is limited to less than major source thresholds. The AIRS classification is "SM".

The facility is located within AQCR 64 and UTM zone 11. The facility is located in Canyon County which is designated as attainment for PM_{10} and CO and unclassified for NO_X, SO_2, lead, and ozone.

The AIRS information provided in Appendix A defines the classification for each regulated air pollutant at MTI. This required information is entered into the EPA AIRS database.

4. APPLICATION SCOPE

The application was submitted for Micron Technology, Inc.'s proposed semiconductor manufacturing facility and related operations at 1401 N. Kings Rd. Nampa, Idaho 83687 (hereafter, "MTI"). The site and certain existing improvements were previously owned and operated by Zilog, Inc. MTI is in the process of installing support facilities in preparation for installing semiconductor manufacturing equipment and pollution control equipment.

The purpose of the application is to:

- Authorize construction, installation of equipment, and operation of the facility.
- Establish facility emission caps (FECs).
- Establish permit conditions related to control equipment operation and the FECs.
- Establish an alternative tracking system for substances listed at IDAPA 58.01.01.585 and 586.

MTI requested that "pre-permit" construction approval be granted within 15 days of DEQ's receipt of this application, pursuant to IDAPA 58.01.01.213. This project is eligible for pre-permit construction approval because:

- The facility is and will be a minor source.
- The facility is not a new major facility or a major modification.
- The facility does not employ offsets or netting.
- The facility's emissions are unlikely to impact any Class I air quality related values.

As specified in IDAPA 58.01.01.213.01.b, a representative of the owner or operator (MTI) consulted with a representative of DEQ prior to the application submittal. On February 16, 2006, via telephone call, Beth Elroy, MTI Environmental Manager consulted with Martin Bauer, DEQ Air Administrator. As required by IDAPA 58.01.01.213.02.a, a copy of the newspaper notice of the required public meeting was provided in Appendix A of the application. The required public meeting was held at the Casler room in the Nampa Civic Center located at 311 3rd St. South in Nampa from 6 to 8 p.m. on April 3rd, 2006. On April 7, 2006, pre-permit construction approval was granted.

4.1 Application Chronology

February 16, 2006	MTI consulted DEQ about obtaining 15 day pre-permit construction approval
March 24, 2006	Application received
March 30, 2006	PTC application fee and processing fee received
April 3, 2006	MTI held public meeting in Nampa
April 7, 2006	DEQ issued pre-permit construction approval letter
April 7, 2006	DEQ determined the application complete
May 24, 2006	DEQ received an application update that included an analysis of uncontrolled TAP emissions
June 9, 2006	DEQ issued a draft permit to MTI for review
June 30, 2006	DEQ received comments on the draft permit from MTI

5. PERMIT ANALYSIS

This section of the Statement of Basis describes the regulatory requirements for this PTC action:

5.1 Equipment Listing

Emission sources at the facility are divided into the following general emission units: manufacturing processes, boilers, emergency equipment, and miscellaneous emission sources. Descriptions of these emission units follow.

5.1.1 Manufacturing Processes

MTI currently operates a semiconductor manufacturing facility at 8000 South Federal Way, Boise, Idaho (hereafter, "MTI-Boise"). Because the MTI-Nampa facility is not yet in operation, MTI estimated process emissions from MTI-Nampa by scaling the estimates from MTI-Boise. The production area at the Nampa facility is approximately 25% of MTI-Boise production areas. This application is based on the conservative assumption that MTI-Nampa will emit 35% as much as MTI-Boise, even though the square footage of the two facilities and the anticipated production lines would imply a smaller fraction. The following text, though much of it written in the present tense, describes how MTI currently anticipates it will operate the Nampa facility under the permit.

5.1.2 VOC and HAP Emissions Mass Balance

The manufacturing process will be the principal source of VOC and HAP emissions from the facility. This describes how VOC and HAP emissions are calculated and controlled. The substance of this section was previously presented in MTI-Boise's May 1999 Tier I permit application, MTI-Boise's March 2003 Tier II permit application, and analyzed by DEQ (see page 18 of the Technical Memorandum supporting the MTI-Boise Tier I permit issued December 24, 2002).

VOC and HAP emissions from manufacturing processes are estimated based on a conservative mass-balance method. The batch nature of the manufacturing process dictates that materials be used in different quantities and different ratios in each of the hundreds of different tools used. Also, as technology continually improves, there may be wholesale changes in the way tools operate or in the type or quantity of material required for a given process. A mass-balance method of estimating emissions can best account for these continuous variations in the production process.

With the exception of some support operations (e.g., general-production cleans, discussed below), all VOC-containing waste materials from manufacturing are segregated and handled as solid non-hazardous waste, hazardous waste, or industrial wastewater. Tracking the production of bulk hazardous waste allows a mass-balance calculation to estimate manufacturing emissions. Any VOCs or HAPs are assumed to be emitted if they cannot be accounted for in the bulk hazardous waste. This is a conservative approach, since the material constituents may also be consumed in the manufacturing process. This mass-balance method accounts for all sources of VOC or HAP emissions in the manufacturing process, including production, fugitive emissions, hazardous or volatile tank or line losses. For this reason, these specific sources of emissions are not fully described separately, but are instead included as part of the manufacturing emissions unit.

The quantity of materials issued from the MTI warehouse and the quantity of bulk liquid hazardous waste shipped offsite are the basic elements of the mass-balance method.

The final element in the mass-balance calculation involves the credit for air pollution control equipment. Calculations for materials used in processes which are vented to air pollution control devices are separated from uncontrolled process calculations where possible. The remaining fraction available to be emitted from controlled processes is reduced by the efficiency of the appropriate control device. Any remaining VOC or HAP constituents represent the air emissions from the MTI facility.

5.1.3 Boilers

Small boilers with rated (nameplate) heat inputs ranging from approximately 1 to 30 million British thermal units per hour (MMBtu/hr) will provide steam to heat the facility as well as to humidify portions of the manufacturing process. In reality, these boilers are physically limited by ambient conditions such that they can not run at their rated capacity for an entire year. The boilers may operate at rated capacity for short periods of time during periods of extreme cold. Nonetheless, hypothetical annual emissions based on continuous operation at the boilers' nameplate capacity are presented in Appendix B.

There are currently three 8.9 MMBtu/hr boilers on-site. MTI plans to install up to 30 MMBtu/hr more boiler capacity to the existing system.

All the boilers are fired by natural gas, and will be operated in a staging process in order to provide a continuous supply of steam for a fluctuating demand. Pressure sensors will be used to fire or idle boilers as needed to maintain steam pressure. Steam used to provide heat to manufacturing processes will not come in contact with the processes.

MTI calculates boiler emissions using EPA's "Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources," also known as AP-42. Boilers are assumed to operate at maximum capacity for 8,760 hours per year when calculating hypothetical emissions.[1]

5.1.4 Emergency Equipment

MTI will maintain three emergency diesel generators for use in sudden and unforeseeable events. The units are estimated to have a rated capacity of 2000 kW each. This equipment usually burns No. 2 diesel fuel oil, but No. 1 diesel can be used during cold weather to prevent the fuel from gelling. To maximize efficiency and for optimum operation, the emergency generators are heated year-round. Both the internal cab where the engine and generator are located and the water/glycol loop that circulates in the engine are heated. This allows the engines to warm up very quickly and reduces visible emissions during cold starts.

Section 3.4, *Large Stationary Diesel and All Stationary Duel Fuel Engines,* from AP-42 is used to calculate emissions from the emergency equipment. Hypothetical emissions from emergency generators are based on operating 200 hours per year.

5.1.5 Miscellaneous Sources

Miscellaneous emission sources include wastewater treatment processes, cooling towers, tanks, and fugitive dust.

5.1.5.1 Wastewater Treatment

Multiple industrial wastewater streams are treated in an effort to recycle, recover, or treat the wastewater. Standard treatment methods include neutralization, precipitation, settling, filtration, reverse osmosis, ion exchange, and degassification. These methods may be used alone or in any number of combinations depending on the characteristics of the wastewater being treated.

5.1.5.2 Cooling Towers

Cooling towers are used at MTI to dissipate heat from non-contact cooling water. An on-demand system is used with the cooling towers to accommodate fluctuating demand for cooling. Cooling demand will dictate when the different cells within a cooling tower configuration are utilized. No chromium-based water treatment chemicals will be used in the circulating water of any of the cooling towers at MTI.

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[1] In reality, the maximum boiler capacity is only required during very cold periods. Consequently, steam demand and boiler operation is limited by ambient temperature; estimated annual emissions based on maximum firing 8,760 hours per year ignores this physical constraint and significantly overstates boiler potential emissions.

Emission rates have been calculated for six cooling towers (three existing and three proposed). These sources have also been included in the modeling simulations. Emissions from cooling towers are based on the drift loss, amount of total dissolved solids (TDS) in the circulating water, water flow rate, and hours of operation. Particulate matter is the only emission relevant to cooling towers and results from dissolved solids in the water carried with drift. Drift loss is the percent of water entrained in the air exhausted from the cooling tower.

There are currently three cooling tower systems located at the facility and MTI proposes to construct three more as process cooling demand increases. These towers have water recirculation rates of 2,400 gallons per minute and air flows of 239,500 actual cubic feet per minute. Each tower has two ten foot circular exhausts. MTI estimated the drift loss from these towers to be 0.02% drift (derived from AP-42, Table 13.4-1 by converting the drift emission factor into a percentage). Water circulated through the cooling towers is maintained with a maximum total dissolved solids (TDS) concentration of 750 ppm. Cooling tower operations depend on cooling demand and may, therefore, fluctuate throughout the year. MTI does not intend to monitor water circulation rate at each tower. Therefore, cooling tower emissions are based on maximum operation of all existing and proposed towers for 8,760 hours per year. An example calculation of potential particulate emissions from the towers is shown below in Equation 6.

$$2{,}400\frac{gal}{\min} * 60\frac{\min}{hr} * 8{,}760\frac{hr}{yr} * 8.34\frac{lb}{gal} * \frac{1\,ton}{2{,}000\,lb} * \frac{750\,parts}{10^6} * \frac{0.02}{100} = 0.79\frac{ton}{yr} \quad (6)$$

H_2O flow rate × time conversions × density of H_2O × weight conversion × TDS concentration × drift loss = total emissions

5.1.5.3 Tanks

Tanks are maintained on-site for the storage and distribution of diesel fuels and temporary storage of hazardous waste. The emergency generators will have dedicated fuel storage tanks. These tanks emit negligible quantities of VOCs. If a tank is installed that meets the applicability criteria for NSPS subpart Kb, MTI will maintain the required records for the tank.

5.1.5.4 Paved and Unpaved Road Fugitive Emissions

MTI has an interest in keeping the facility as clean as possible. Dust is detrimental to semiconductor manufacturing and MTI operates in a fashion that minimizes particulate matter generation. In an effort to limit particulate matter generated from outside sources, all major traffic areas have been paved.

5.2 Emissions Inventory

Proposed Facility Emission Cap

Table 5.2.1 summarizes MTI's proposed growth and operational variability components, and a proposed FEC for each criteria pollutant from all sources at the facility. The proposed permit conditions presented in Section 5.5 consider appropriate record-keeping and reporting requirements to ensure compliance with the FECs.

TABLE 5.2.1 CRITERIA POLLUTANT BASELINE EMISSIONS AND PROPOSED FEC

	NO_x (T/yr)	CO (T/yr)	SO_2 (T/yr)	VOC (T/yr)	PM_{10} (T/yr)	Pb (lb/yr)
Baseline Actual Emissions	0	0	0	0	0	0
Operational Variability Component	20	20	5	39	10	60
Proposed Growth Component	46	25	.2	34	10	0
Total Proposed FEC(a)	66	46	6	73	20	60

(a) Emissions rounded up to the nearest whole ton per year.

Table 5.2.2 includes estimated actual HAP emissions from the Micron-Nampa facility. Estimates of actual emissions are based on 35% of emissions at Micron-Boise.

TABLE 5.2.2 HAP EMISSIONS

Year	MTI-Boise Facility-wide HAP Emissions (Tons/yr)	HAP Emitted in Greatest Quantity	MTI-Boise Greatest Individual HAP Emission (Tons/yr)
2001	12.3	Hydrofluoric Acid	4.0
2002	13.3	Hydrochloric Acid	4.0
2003	12.2	Hydrofluoric Acid	5.1
2004	17.5	2-(2-Butoxyethoxy)Ethanol	4.6
Maximum	17.5	Hydrochloric Acid	5.1
MTI-Nampa Estimate	**6.4**	**Hydrochloric Acid**	**1.9**

Toxic Air Pollutants

MTI-Boise has an extensive system for tracking raw materials used at the facility; MTI-Nampa will use a similar system. This system, which is based on the MSDS for each raw material, will enable MTI to track chemicals by CAS number and common name. Some raw materials result in emissions of substances listed at IDAPA 58.01.01.585 and 586.

Assuming process emissions from MTI-Nampa are 35% of those from MTI-Boise, Table 5.2.3 on the following page presents estimates of emissions of those substances listed at 585 and 586 that are anticipated to be emitted in the greatest quantities. A complete list of substances listed at Sections 585 and 586 that the facility is anticipated to emit is provided in Appendix B. Substances listed in Table 5.2.3 are ranked by the percentage of actual annual emissions versus the corresponding EL (established at IDAPA 58.01.01.585 and 586).

Almost all of the substances listed in Sections 585 and 586 are estimated to be emitted (facility-wide) in quantities well below the ELs. However, emissions of some substances are estimated to exceed the ELs. If an increase greater than an EL is proposed, one demonstrates compliance with criteria listed at IDAPA 58.01.01.585 and 586 with a modeling analysis to ensure that predicted concentrations are less than Acceptable Ambient Concentrations (AACs) and Acceptable Ambient Concentrations for Carcinogens (AACCs). For those substances emitted at rates exceeding its EL, MTI conducted a very conservative modeling analysis that demonstrates that uncontrolled facility-wide process emissions would not result in ambient concentrations exceeding the AAC or AACC for any of the substances listed at IDAPA 58.01.01.585 or 586. Predicted concentrations for those substances with emissions exceeding the ELs are also displayed in Table 5.2.3. All predicted concentrations are less than the AACs and the AACCs.

TABLE 5.2.3 SUBSTANCES LISTED AT IDAPA 58.01.01.585 AND 586 ESTIMATED EMISSIONS RATES POTENTIALLY EXCEEDING THE ELS

CAS#	Material	Uncontrolled Emission Rate (lb/hr)	Anticipated Actual Emission Rate (lb/hr)	IDAPA EL (lb/hr)	Uncontrolled Emissions Exceed EL Y/N	IDAPA AAC/ AACC	Uncontrolled Impact	Uncontrolled % of AAC/AACC
14808-60-7	Silica - Quartz	8.86E-01	8.86E-02	0.0067	Yes	5	4.50	90%
7664-39-3	Hydrofluoric Acid (Fluorides As F)	1.16E+01	2.60E-01	0.167	Yes	125	59.07	47%
7664-41-7	Ammonia	3.17E+01	5.76E+00	1.2	Yes	900	160.93	18%
7647-01-0	Hydrochloric Acid	1.20E+00	6.00E-02	0.05	Yes	375	6.09	2%
7664-93-9	Sulfuric Acid	1.19E+00	4.20E-02	0.067	Yes	50	6.06	12%
7697-37-2	Nitric Acid	9.94E-01	5.40E-02	0.333	Yes	250	5.05	2%
101-68-8	Methylene Bisphenyl Isocyanate	7.43E-03	7.40E-03	0.003	Yes	2.5	0.04	2%
1310-58-3	Potassium Hydroxide	2.71E-01	2.70E-01	0.133	Yes	100	1.38	1%
7782-50-5	Chlorine	2.75E-01	2.80E-01	0.2	Yes	150	1.40	1%
10035-10-6	Hydrogen Bromide	8.89E-02	1.90E-02	0.0667	Yes	500	0.45	0%
123-42-2	Diacetone Alcohol	2.11E+01	3.90E-01	16	Yes	12000	107.28	1%
111-40-0	1,2-Ethanediamine, N-(2-Aminoethyl)-	3.47E-01	3.50E-01	0.267	Yes	200	1.76	1%
7681-57-4	Sodium Metabisulfite	3.92E-01	3.90E-01	0.333	Yes	250	0.28	0%

a. The estimated emission rates here are assumed to be 35% of the average 2004 MTI-Boise emissions.

5.3 Modeling

A detailed modeling analysis that demonstrates compliance with the NAAQS is found in Appendix C.

5.4 Regulatory Review

This section describes the regulatory analysis of the applicable air quality rules with respect to this PTC.

IDAPA 58.01.01.201 .... Permit to Construct Required

The facility's proposed project does not meet the permit to construct exemption criteria contained in Sections 220 through 223 of the Rules. Therefore, a PTC is required.

IDAPA 58.01.01.203 .... Permit Requirements for New and Modified Stationary Sources

The applicant has shown to the satisfaction of DEQ that the facility will comply with all applicable emissions standards, ambient air quality standards, and toxic increments.

IDAPA 58.01.01.210 .... Demonstration of Preconstruction Compliance with Toxic Standards

The applicant has demonstrated preconstruction compliance for all TAPs identified in the permit application. To determine toxic air pollutant emissions from the MTI-Nampa facility, MTI estimated that emissions would be approximately 35% of those at the MTI-Boise facility. The emissions rate for silica is estimated to be slightly less at the Nampa facility due to the type of operations planned for the facility. The estimated emissions rate of some toxics exceeded the screening emissions levels in IDAPA 58.01.01.585-586 so MTI conducted modeling to demonstrate that the emissions rate will not cause an exceedance of the AAC or AACC. Toxic air pollutant emissions from the facility will be controlled (by either a wet scrubber or VOC oxidation unit), however, MTI modeled the uncontrolled emissions rates and demonstrated that the facility would be in compliance with the AACs and AACCs even without air pollution control equipment. Therefore, MTI has demonstrated preconstruction compliance with the toxic air pollutant standards in accordance with IDAPA 58.01.01.210.06. Because uncontrolled emissions demonstrate compliance with the acceptable ambient concentration limits, no TAP limits are required in the permit.

IDAPA 58.01.01.224 .... Permit to Construct Application Fee

The applicant satisfied the PTC application fee requirement by submitting a fee of $1,000.00 on March 30, 2006.

IDAPA 58.01.01.225 .... Permit to Construct Processing Fee

The total emissions from the proposed new nonmajor facility are more than 100 T/yr; therefore, the associated processing fee is $7,500.00. The PTC processing fee was received March 30, 2006.

40 CFR 63, Subpart BBBBB .... National Emissions Standards for Hazardous Air Pollutants for Semiconductor Manufacturing

In accordance with 40 CFR 63.7181, "(a) You are subject to this subpart if you own or operate a semiconductor manufacturing process unit that is a major source of hazardous air pollutants (HAP) emissions or that is located at, or is part of, a major source of HAP emissions. (b) A major source of HAP emissions is any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit, considering controls, in the aggregate, any single HAP at a rate of 10 tons per year (tpy) or more or any combination of HAP at a rate of 25 tpy or more."

The MTI-Nampa facility is not subject to this subpart because it is not a major source of hazardous air pollutants. The permit contains a limit to prevent emissions from exceeding 10 tons per year of any single HAP or 25 tons per year of any combination of HAPs.

40 CFR 60, Subpart Dc....................Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

This subpart applies to each steam generating unit for which construction commenced after June 9, 1989, and has a maximum design heat input capacity of 100 MMBtu/hr or less, but greater than 10 MMBtu/hr. MTI may install an additional boiler with a heat input capacity between 10 and 29 MMBtu/hr. The permit limits boiler capacity to below 30 MMBtu/hr because MTI doesn't expect to need any more boiler capacity than that, and boilers with a capacity of 30 MMBtu/hr or greater are required by the subpart to conduct particulate matter testing in accordance with 40 CFR 60.45c. Therefore, limiting the boiler capacity below 30 MMBtu/hr avoids source testing requirements.

5.5 Permit Conditions Review

The purpose of the permit is to:

- Authorize construction, installation of equipment, and operation of the facility,
- Establish facility emission caps (FECs),
- Establish permit conditions related to control equipment operation and the FECs,
- Establish an alternative tracking system for substances listed at IDAPA 58.01.01.585 and 586.

In this section, the FEC request is detailed and related permit conditions are proposed.

5.5.1 Facility Emissions Cap

As provided by the new FEC rule, MTI proposes to establish FECs for criteria air pollutants that will constitute preconstruction approval and allow flexibility to reconfigure and install new fabrication tools and related pollution control equipment without performing individual PTC applicability determinations for each project. Note that the boilers, emergency generators, and cooling towers were evaluated in the dispersion modeling based on their theoretical maximum emission rates and therefore emission-unit specific limits are not warranted for those sources.

The FEC rule describes three potential components of a FEC: 1) baseline actual emissions, 2) an operational variability component and 3) an optional growth component.

Baseline Actual Emissions

The facility is not currently in operation, so the baseline actual emissions are zero.

Operational Variability Component

As defined in the FEC rule, the allowance for operational variability may be up to the significant emission rate minus one ton per year. If the significant emission rate is less than ten tons per year, then DEQ and the applicant must negotiate the operational variability component of the FEC.

MTI has chosen not to request the maximum operational variability for any of the criteria pollutants except VOCs. MTI proposes a FEC on lead emissions of 60 pounds per year, which is 5 percent of the 1,200 pound per year significant emission rate for lead.

The proposed operational variability components of the FEC for relevant criteria pollutants are included in Table 5.5.1.

Growth Component

The FEC rule includes a growth component "to allow for potential future business growth or facility changes that may increase emissions." Table 5.5.1 identifies anticipated emission increases attributable to installation of the proposed boilers, generators, and the manufacturing process. Using the parlance of the FEC rule, these emissions comprise the "Growth Component" of the FEC because they represent emission changes at the facility that are anticipated to occur over the course of the permit term.

Although there were three boilers on the property when MTI purchased the facility, there is no current permit governing their operation. Through the combined PTC and FEC application, MTI proposes to allow for modification and start-up of the existing boilers, plus installation and operation of an additional 29 MMBtu/hr of boiler capacity and three diesel generators. NO_x, SO_2, VOC, PM_{10}, and CO emissions attributable to the boilers and generators are based on AP-42 emission factors. Annual hypothetical emissions from the boiler capacity are based on operating 8,760 hours per year. Annual emissions for the new generators are based on all three generators operating 200 hours per year.[2]
The production contribution to PM_{10} and VOC FEC growth components was determined by assuming the new manufacturing units would have emissions equivalent to 35% of MTI-Boise's average 2003-2004 manufacturing emissions (which were 95 T/yr of VOC emissions and 7.1 T/yr of PM_{10} emissions).

Proposed Facility Emission Cap

Table 5.5.1 summarizes MTI's proposed growth and operational variability components, and a proposed FEC for each criteria pollutant from all sources at the facility. Details of the calculation of the growth component are provided in the application. The proposed conditions presented in Section 5.5.2 consider appropriate recordkeeping and reporting requirements to ensure compliance with the FECs. In addition, the FEC limits hazardous air pollutant emissions below major source thresholds.

Table 5.5.1 CRITERIA POLLUTANT BASELINE EMISSIONS AND PROPOSED FEC

FEC Components	NOx (T/yr)	CO (T/yr)	SO2 (T/yr)	VOC (T/yr)	PM10 (T/yr)	Pb (lb/yr)
Baseline Actual Emissions	0	0	0	0	0	0
Operational Variability Component	20	20	5	39	10	60
Proposed Growth Component	46	26	1	34	10	0
Total Proposed FEC[a]	66	46	6	73	20	60

[a]Emissions rounded up to the nearest whole ton per year.

5.5.2 Specific Proposed Conditions

This section identifies appropriate permit conditions relevant to operation of emission control devices and the proposed FECs.

Criteria Pollutant and HAP Facility Emissions Cap

The PM_{10}, SO_2, NO_X, CO, VOC, Pb, and HAP emissions from the MTI facility shall not exceed any corresponding facility emissions cap (FEC) limits listed in Table 5.5.2.

Table 5.5.2 FEC EMISSIONS LIMITS

Source DESCRIPTION	PM_{10}	SO_2	NO_X	VOC	CO	Pb	Individual HAPs	Aggregate HAPs
	T/yr	T/yr	T/yr	T/yr	T/yr	lb/yr	T/yr	T/yr
Total Facility Emissions Cap	20	6	66	73	46	60	<10	<25

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[2] Given MTI's commitment to operating the diesel generators no more than 200 hours per year, the generators are exempt from pre-construction permitting requirements. MTI is identifying the diesel generators in this application for information purposes only.

Compliance with the criteria pollutant emissions cap will be determined by determining the rolling 12-month emissions from the boilers and generators based on fuel consumption emissions factors and adding the emissions determined from the manufacturing process using material usage records and control efficiencies from wet scrubbers and VOC abatement units.

For facility changes that comply with the terms and conditions establishing the FEC, but are not included in the estimate of ambient concentration analysis approved for the permit establishing the FEC, the permittee shall review the estimate of ambient concentration analysis. In the event the facility change would result in a significant contribution above the design concentration determined by the estimate of ambient concentration analysis approved for the permit establishing the FEC, but does not cause or significantly contribute to a violation to any ambient air quality standard, the permittee shall provide notice to the Department in accordance with IDAPA 58.01.01.181.01.b. The permittee shall record and maintain documentation of the review on site.

MTI shall report to the Department the rolling 12-month total criteria pollutant and HAP emissions annually in accordance with IDAPA 58.01.01.178.04(b).

HAP Facility Emissions Cap

Hazardous air pollutant (HAP) emissions shall not exceed 10 tons per year for any individual HAP and 25 tons per year for the aggregate of all HAPs. Hazardous air pollutants are those listed in or pursuant to Section 112(b) of the Clean Air Act.

Compliance with the HAP FEC will be determined in the same manner as the criteria pollutant emissions. HAP emissions from the boilers, generators, and manufacturing process will be calculated on a rolling 12-month basis using combustion emissions factors for the boilers and generators and material usage records with associated scrubber and abatement unit control efficiencies for the manufacturing process.

Wet Scrubber Permit Conditions

Wet scrubbers will be used throughout the facility to control emissions of acids, bases, and water-soluble constituents that are predominantly emitted from the process cleaning steps but also from the etch steps. The application demonstrated that the wet scrubbers are not required to meet toxic air pollutant emissions standards. That is, the uncontrolled emissions of toxic air pollutants are in compliance with the Rules, but MTI is still going to install and operate wet scrubbers. Because the wet scrubbers are not required to meet the 24-hour emissions standards MTI requested that scrubber flowrate monitoring only be required on a monthly basis.

The recirculating contact liquid in the scrubbers is water with a controlled pH. Water flow rate, pH and media packing depth are directly related to efficiency. Instruments to measure liquid flow rate and pH are installed and maintained for each scrubber.

As an alternative to an operations and maintenance manual for each wet scrubber, MTI proposed to develop a log containing the minimum water recirculation flow rate required to maintain proper performance for each of the wet scrubbers based on manufacturer's data or applicable engineering data. The log will be continually updated as new scrubbers are added or existing scrubbers are modified. The log will be maintained on-site and made available to DEQ representatives upon request.

VOC Abatement Devices Permit Conditions

MTI-Boise's current Tier I operating permit includes a number of conditions governing operation of VOC abatement devices. MTI proposed to use these same conditions at the facility in Nampa. Essentially, all coat track units at the facility are required to be controlled by a VOC thermal-oxidation unit, identified as VOC abatement units. "Coat track" means a semiconductor manufacturing tool that performs a process called coat bake in the photolithography area of the facility. Operating and monitoring requirements for the VOC abatement units are included in the permit. The application demonstrated that the VOC abatement units are not required to meet toxic air pollutant emissions standards. That is, the uncontrolled emissions of toxic air pollutants are in compliance with the Rules, but MTI is still going to install and operate the VOC abatement units. Because the VOC abatement units are not required to meet the 24-hour emissions standards, MTI requested that monitoring of abatement unit operating conditions only be required on a monthly basis.

MTI is required to operate the VOC abatement units according to manufacturers' recommendations as follows:

a) Oxidation temperature shall be 1,350 degrees F or greater.
b) Desorption temperature shall be 340 degrees F or greater.
c) Each unit shall not be operated outside of the manufacturer's design capacity.

Toxic Air Pollutant Permit Conditions

In support of MTI's request for construction and operation of the Nampa facility and for pre-authorization of future facility changes, MTI has addressed the considerations for compliance with toxic standards in IDAPA 58.01.01.210. IDAPA 58.01.01.210.04 allows a source to demonstrate preconstruction compliance with Section 210 through any of the standard methods in IDAPA 58.01.01.210.05 through 210.08. MTI has addressed compliance with the toxic standards by modeling the uncontrolled emissions rates in accordance with Section 210.06.

MTI-Boise has implemented an extensive system for tracking raw materials used at the facility; MTI-Nampa will use a similar system. This system, which is based on MSDSs for each raw material, will enable MTI to track chemicals by CAS number and common name. Some raw materials result in emissions of substances listed at IDAPA 58.01.01.585 and 586.

Assuming process emissions from MTI-Nampa are 35% of those from MTI-Boise, as seen previously, Table 5.2.3 presents estimates of emissions of those substances listed at 585 and 586 that are anticipated to be emitted in the greatest quantities. A complete list of substances listed at Sections 585 and 586 that the facility is anticipated to emit is provided in Appendix B.

Because MTI demonstrated pre-construction compliance with the toxic standards, no specific limits on toxic air pollutants are included in the permit. However, MTI proposed that the permit include a requirement to monitor and record monthly average toxic air pollutant emissions and a method for demonstrating on-going compliance with TAP standards. The compliance demonstration method included in the permit allows MTI to increase TAP emissions up to the respective AAC or AACC for each TAP by:

1. Using the equations in the permit to determine the hourly emissions rate (E_{ia}) that results in an ambient concentration of 80% of the AAC or AACC. The equations in the permit use a Chi/Q value developed through conservative modeling presented in the permit application that predicts the ambient impact of a one pound per hour emissions rate for either a 24-hour averaging period ($CQ_{24\text{-}hr}$) or an annual averaging period (CQ_{annual}).
2. If the monthly average emissions rate (E_i) exceeds the hourly emissions rate from the respective E_{ia} equation that is equal to 80% of the AAC or AACC, then MTI must conduct refined modeling to demonstrate compliance with the respective AAC or AACC.

If MTI follows the requirements of the permit MTI does not need to perform or document a permit exemption for any individual semiconductor process modification that may result in an increase in TAP emissions under IDAPA 58.01.01.223. Compliance with the permit conditions provides a level of tracking TAP emissions that is at least as stringent as that provided in IDAPA 58.01.01.223 because the permit limits any additional emissions increases to the AAC or AACC. That is, the permit restricts toxic emissions to the permit exemption levels. This provides reasonable assurance of compliance with IDAPA 58.01.01.161 (toxic contaminants shall not be emitted in quantities that would injure or unreasonably affect human or animal life or vegetation) and the monitoring and recordkeeping burden for MTI is decreased because they do not have to document TAP exemptions for every process change.

NSPS Boiler Permit Conditions

MTI may install additional boiler capacity at the Nampa facility. Three existing 8.9 MMBtu/hr boilers were on on-site at the time of purchase from Zilog. MTI may install up to an additional 29 MMBtu/hr of natural gas-fired boiler capacity. If the new boiler is between 10 and 29 MMBtu/hr it will be an NSPS Subpart Dc affected unit and MTI will need to comply with the recordkeeping, reporting, and notification requirements of Subpart Dc. Applicable requirements are included in the permit.

Changes to General Provisions

General Provision 3, regarding DEQ's inspection and source test authority, was replaced with language form the Tier I operating permit general provisions that more accurately states DEQ's authority to inspect the facility.

General Provision 5, regarding written notifications to DEQ, was modified to remove the following requirements that are not specifically required by the Rules and are not needed for a facility operating under a facility emissions cap:

- A notification of the date of initiation of construction, within five working days after occurrence;
- A notification of the date of completion/cessation of construction, within five working days after occurrence;
- A notification of the initial date of achieving the maximum production rate, within five working days after occurrence - production rate and date

6. PERMIT FEES

A permit to construct application fee of $1,000 was due to DEQ at the time of application submittal. The $1,000 application fee was received March 30, 2006. The total emissions from the proposed new nonmajor facility are more than 100 T/yr; therefore, the associated processing fee is $7,500.00. The PTC processing fee was also received on March 30, 2006 along with the application fee in one lump sum payment of $8,500.

Table 6.1 PTC PROCESSING FEE TABLE

Emissions Inventory			
Pollutant	**Annual Emissions Increase (T/yr)**	**Annual Emissions Reduction (T/yr)**	**Annual Emissions Change (T/yr)**
NO_X	66.0	0	66.0
SO_2	6.0	0	6.0
CO	46.0	0	46.0
PM_{10}	20.0	0	20.0
VOC	73.0	0	73.0
TAPS/HAPS	6.4	0	6.4
Total:	217.4	0	217.4
Fee Due	**$ 7,500.00**		

7. PERMIT REVIEW

7.1 *Regional Review of Draft Permit*

The Boise regional office was provided a copy of the draft permit via email on June 8, 2006. Tom Krinke responded on June 23, 2006, with no comments.

7.2 *Facility Review of Draft Permit*

MTI requested review of a draft permit. The draft permit was issued to MTI on June 9, 2006. DEQ received comments on June 30, 2006.

In the comments received June 30, 2006, MTI requested the opportunity to review a second draft permit that included the modeling memo that was not included in the initial draft and DEQ's response to MTI's comments. In a phone call between Dustin Holloway (Micron) and Zach Klotovich (DEQ) on Monday, July 10, 2006, it was agreed that Micron would like to have a final permit issued as soon as possible, so rather than formally issue a second facility draft, DEQ will informally email a copy of the final permit package to Micron before the final permit begins internal DEQ review.

7.3 *Public Comment*

An opportunity for public comment period on the PTC application was provided from April 19, 2006, to May 18, 2006, in accordance with IDAPA 58.01.01.209.01.c. During this time, there were no comments on the application and no requests for a public comment period on DEQ's proposed action.

8. RECOMMENDATION

Based on review of application materials and all applicable state and federal rules and regulations, staff recommend that Micron Technology, Inc., be issued PTC No. P-060013 for the Nampa facility. No public comment period is recommended, no entity has requested a comment period, and the project does not involve PSD requirements.

ZQK/bf Permit No. P-060013

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Appendix A

AIRS Information

P-060013

AIRS/AFS[a] FACILITY-WIDE CLASSIFICATION[b] DATA ENTRY FORM

Facility Name: Micron Technology, Inc.
Facility Location: 1401 N. Kings Road, Nampa, ID
AIRS Number: 027-00095

AIR PROGRAM POLLUTANT	SIP	PSD	NSPS (Part 60)	NESHAP (Part 61)	MACT (Part 63)	SM80	TITLE V	AREA CLASSIFICATION A-Attainment U-Unclassified N- Nonattainment
SO_2	B	B					B	U
NO_x	B	B					B	U
CO	B	B					B	A
PM_{10}	B	B					B	A
PT (Particulate)	B	B					B	U
VOC	SM	SM					SM	U
THAP (Total HAPs)	SM	ND					SM	U
			APPLICABLE SUBPART					
			Dc					

[a] Aerometric Information Retrieval System (AIRS) Facility Subsystem (AFS)

[b] AIRS/AFS Classification Codes:

A = Actual or potential emissions of a pollutant are above the applicable major source threshold. For HAPs only, class "A" is applied to each pollutant which is at or above the 10 T/yr threshold, or each pollutant that is below the 10 T/yr threshold, but contributes to a plant total in excess of 25 T/yr of all HAPs.

SM = Potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable regulations or limitations.

B = Actual and potential emissions below all applicable major source thresholds.

C = Class is unknown.

ND = Major source thresholds are not defined (e.g., radionuclides).

Appendix B

Emissions Inventory

P-060013

TABLE E-1
EMISSION FACTORS, UNIT RATINGS, AND RESULTING EMISSION RATES

Boilers (AP-42 Natural gas combustion emission factors, Tables 1.4-1 and 1.4-2)

Quantity	Assumptions	NOx	CO	SO2	PM10	VOC
1	30 MMBtu/hr	100 lb/MMscf	84 lb/MMscf	0.60 lb/MMscf	7.6 lb/MMscf	5.50 lb/MMscf
	8,760 hr/yr	12.5 T/yr	10.5 T/yr	0.075 T/yr	0.95 T/yr	0.048 T/yr
	1,050 Btu/scf	2.9 lb/hr	2.4 lb/hr	0.017 lb/hr	0.217 lb/hr	0.011 lb/hr
3	8.9 MMBtu/hr	100 lb/MMscf	84 lb/MMscf	0.60 lb/MMscf	7.6 lb/MMscf	5.50 lb/MMscf
	8,760 hr/yr	3.7 T/yr	3.1 T/yr	0.022 T/yr	0.28 T/yr	0.048 T/yr
	1,050 Btu/scf	0.8 lb/hr	0.7 lb/hr	0.005 lb/hr	0.064 lb/hr	0.011 lb/hr

Generators (AP-42 Large stationary diesel engines emission factors, Table 3.4-1)

Quantity	Assumptions	NOx	CO	SO2	PM10	VOC
3	2,945 hp	0.024 lb/bhp-hr	5.5E-03 lb/bhp-hr	4.05E-05 lb/bhp-hr	0.0007 lb/bhp-hr	0.0007 lb/bhp-hr
	200 hr/yr	7.068 T/yr	1.620 T/yr	0.012 T/yr	0.206 T/yr	0.208 T/yr
	0.5% Sulfur	70.7 lb/hr	16.2 lb/hr	0.119 lb/hr	2.1 lb/hr	2.1 lb/hr

VOC Unit (AP-42 Natural gas combustion emission factors, Tables 1.4-1 and 1.4-2)

Quantity	Assumptions	NOx	CO	SO2	PM10	VOC
1	2.0 MMBtu/hr	100 lb/MMscf	84 lb/MMscf	0.57 lb/MMscf	7.6 lb/MMscf	5.50 lb/MMscf
	8,760 hr/yr	50.0 lb/MMBtu	42.0 lb/MMBtu	0.285 lb/MMBtu	3.80 lb/MMBtu	2.75 lb/MMBtu
	1,000 Btu/scf	0.876 T/yr	0.736 T/yr	0.005 T/yr	0.067 T/yr	0.048 T/yr
	0.002 MMscf/hr	0.200 lb/hr	0.168 lb/hr	0.001 lb/hr	0.015 lb/hr	0.011 lb/hr

Cooling Towers (AP-42 Wet cooling towers, Section 13.4)

Quantity	Assumptions	NOx	CO	SO2	PM10	VOC
6 (two stacks each)	2,400 gal H2O/min 8.34 lb/gal H2O 8,760 hr/yr				750 ppm TDS 0.02% drift loss 0.789 T/yr 0.180 lb/hr	

Processes

	Assumptions	NOx	CO	SO2	PM10	VOC
	MTI-Boise Process				7.1 T/yr	94.9 T/yr
	35% Factor				2.485 T/yr	33.215 T/yr
	8,760 hr/yr				0.567 lb/hr	7.583 lb/hr

Micron Technology, Inc. - Nampa
Table F-1 Supplement
Updated Emissions Estimates for Substances Regulated by IDAPA 58.01.01.585-586

CAS#	Material	Uncontrolled Emission Rate (lb/hr)	Anticipated Actual Emission Rate (lb/hr)	IDAPA EL (lb/hr)	Uncontrolled Emissions Exceed EL Y/N	IDAPA AAC/ AACC	Uncontrolled Impact	Uncontrolled % of AAC/AACC
14808-60-7	Silica - Quartz	3.5[illegible]	8.5[illegible]	0.0067	Yes	5	4.35	90%
7664-39-3	Hydrofluoric Acid (Fluoride As F)	1.1[illegible]+00	2.6[illegible]	0.167	Yes	125	59.87	47%
7664-41-7	Ammonia	3.17[illegible]+00	5.7[illegible]+00	1.2	Yes	900	168.9	19%
7647-01-0	Hydrochloric Acid	1.3[illegible]+00	6.0[illegible]	0.05	Yes	375	6.69	2%
7664-93-9	Sulfuric Acid	1.1[illegible]+00	4.5[illegible]	0.067	Yes	50	8.00	15%
7697-37-2	Nitric Acid	9.9[illegible]	3.4[illegible]	0.333	Yes	250	5.65	2%
101-68-8	Methylene Bisphenyl Isocyanate	7.4[illegible]	7.4[illegible]	0.003	Yes	3.5	0.04	1%
1310-58-3	Potassium Hydroxide	2.71[illegible]	2.7[illegible]	0.133	Yes	100	1.28	1%
7782-50-5	Chlorine	2.7[illegible]	2.6[illegible]	0.2	Yes	150	1.40	1%
10035-10-6	Hydrogen Bromide	8.0[illegible]	1.0[illegible]	0.0067	Yes	500	0.43	0%
123-42-2	Diacetone Alcohol	3.11[illegible]+01	3.5[illegible]	16	Yes	12000	167.30	1%
111-40-0	1,2-Ethanediamine, N-(2-Aminoethyl)-	3.4[illegible]	3.5[illegible]	0.287	Yes	200	1.75	1%
7681-57-4	Sodium Metabisulfite	3.5[illegible]	3.5[illegible]	0.333	Yes	250	0.35	0%
1310-73-2	Sodium Hydroxide	1.3[illegible]	1.3[illegible]	0.133	No	100		
14464-46-1	Crystalline Silica, Cristobalite	3.[illegible]	2.5[illegible]	0.0033	No	2.5		
7722-84-1	Hydrogen Peroxide	9.7[illegible]	3.9[illegible]	0.1	No	75		
75-09-2	Methylene Chloride	1.8[illegible]	1.3[illegible]	0.0016	No	0.24		
50-00-0	Formaldehyde	4.1[illegible]	4.1[illegible]	0.00051	No	0.077		
1314-56-3	Phosphorus Pentoxide	3.1[illegible]	3.[illegible]	0.067	No	50		
67-63-0	Isopropanol	1.5[illegible]+00	4.6[illegible]+00	65.3	No	49000		
12001-26-2	Mica (Mica Minerals)	3.4[illegible]	3.4[illegible]	0.2	No	150		
123-91-1	1,4-Dioxane	5.3[illegible]	6.4[illegible]	0.0048	No	0.71		
1309-37-1	Iron Oxide	6.3[illegible]	6.3[illegible]	0.333	No	250		
111-42-2	Diethanolamine	1.0[illegible]	1.0[illegible]	1	No	750		
1477-55-0	M-Xylene Diamine	6.5[illegible]	6.5[illegible]	0.0067	No	0.5		
71-43-2	Benzene	7.5[illegible]	7.5[illegible]	0.0008	No	0.12		
7784-42-1	Arsine	1.1[illegible]	1.3[illegible]	0.013	No	10		
144-62-7	Oxalic Acid	3.1[illegible]	3.1[illegible]	0.067	No	50		
64-19-7	Acetic Acid	1.4[illegible]	2.3[illegible]	1.67	No	1250		
108-65-6	1-Methoxy-2-Propanol Acetate	1.3[illegible]+00	4.2[illegible]	25	No	[illegible]		
7783-54-2	Nitrogen Trifluoride	6.4[illegible]	6.4[illegible]	1.93	No	1450		
108-95-2	Phenol	3.7[illegible]	3.5[illegible]	1.27	No	950		
7723-14-0	Phosphorus	2.9[illegible]	2.5[illegible]	0.007	No	5		
1305-62-0	Calcium Hydroxide	1.0[illegible]	1.0[illegible]	0.333	No	250		
10024-97-2	Nitrous Oxide	1.71[illegible]	1.7[illegible]	6	No	4500		
67-64-1	Acetone	3.7[illegible]+00	3.7[illegible]+00	119	No	89000		
7553-56-2	Iodine	1.7[illegible]	1.7[illegible]	0.0067	No	1		
107-98-2	2-Propanol, 1-Methoxy-	3.9[illegible]	6.1[illegible]	24	No	18000		
75-21-8	Ethylene Oxide	1.4[illegible]	1.4[illegible]	[illegible]	No	0.01		
7637-07-2	Boron Trifluoride	1.2[illegible]	3.5[illegible]	0.2	No	150		
25551-13-7	Trimethyl Benzene	1.3[illegible]	3.4[illegible]	8.2	No	6150		
1338-23-4	Methyl Ethyl Ketone Peroxide	1.2[illegible]	1.2[illegible]	0.1	No	7.5		
64-17-5	Ethanol	1.1[illegible]+00	1.1[illegible]+00	125	No	94000		
7664-38-2	Phosphoric Acid	4.6[illegible]	4.3[illegible]	0.067	No	50		
100-41-4	Ethylbenzene	1.7[illegible]	1.3[illegible]	29	No	21750		
123-86-4	Acetic Acid, Butyl Ester	2.7[illegible]	2.3[illegible]	47.3	No	35500		
91-20-3	Naphthalene	1.0[illegible]	4.7[illegible]	3.33	No	2500		
106-99-0	1,3-Butadiene	1.7[illegible]	1.4[illegible]	0.00024	No	0.0036		
141-43-5	2-Aminoethanol	2.5[illegible]	2.1[illegible]	0.53	No	400		
127-19-5	Dimethylacetamide	1.2[illegible]	1.2[illegible]	2.33	No	1750		
108-94-1	Cyclohexanone	2.3[illegible]	1.7[illegible]	6.67	No	5000		
107-21-1	Ethylene Glycol	3.2[illegible]	3.2[illegible]	[illegible]	No	6350		
123-31-9	Hydroquinone	3.0[illegible]	3.2[illegible]	0.133	No	100		
85-44-9	Phthalic Anhydride	1.6[illegible]	1.6[illegible]	0.4	No	300		
100-42-5	Styrene	1.5[illegible]	1.5[illegible]	6.67	No	1000		
120-80-9	Catechol	2.5[illegible]	2.5[illegible]	1.33	No	1000		
75-07-0	Acetaldehyde	3.1[illegible]	3.3[illegible]	0.003	No	0.45		
1303-96-4	Borax	1.0[illegible]	1.0[illegible]	0.067	No	50		
109-99-9	Tetrahydrofuran	5.7[illegible]	5.9[illegible]	39.3	No	29500		
111-76-2	2-Butoxy Ethanol	8.7[illegible]	8.0[illegible]	8	No	6000		
110-54-3	Hexane	1.1[illegible]	1.1[illegible]	12	No	9000		
112926-00-8	Silica, Amorphous	1.3[illegible]	1.3[illegible]	0.667	No	500		
7782-41-4	Fluorine	1.0[illegible]	1.0[illegible]	0.133	No	100		
78-93-3	Methyl Ethyl Ketone	2.9[illegible]	2.9[illegible]	39.3	No	29500		
107-15-3	1,2-Ethanediamine	1.2[illegible]	1.3[illegible]	1.67	No	1250		
124-40-3	Methanamine, N-Methyl-	3.1[illegible]	3.2[illegible]	0.613	No	460		
8052-41-3	Stoddard Solvent	1.7[illegible]	9.4[illegible]	35	No	26250		
60676-86-0	Silica, Amorphous (Fused)	3.1[illegible]	3.1[illegible]	0.0067	No	5		
628-63-7	Acetic Acid, Pentyl Ester	1.6[illegible]	1.1[illegible]	35.5	No	26600		
1314-13-2	Zinc Oxide	1.5[illegible]	1.5[illegible]	0.333	No	250		
131-11-3	Dimethyl Phthalate	1.1[illegible]	1.3[illegible]	0.333	No	250		
7631-90-5	Sodium Bisulfite	1.1[illegible]	1.0[illegible]	0.333	No	250		
110-43-0	2-Heptanone	4.1[illegible]	1.0[illegible]	15.7	No	11750		
67-56-1	Methanol	4.3[illegible]	4.3[illegible]	17.3	No	13000		

5/24/2000

Page 1 of 2

Micron Technology, Inc. - Nampa
Table F-1 Supplement
Updated Emissions Estimates for Substances Regulated by IDAPA 58.01.01.585-586

CAS#	Material	Uncontrolled Emission Rate (lb/hr)	Anticipated Actual Emission Rate (lb/hr)	IDAPA EL (lb/hr)	Uncontrolled Emissions Exceed EL Y/N	IDAPA AAC/ AACC	Uncontrolled Impact	Uncontrolled % of AAC/AACC
124-17-4	Diethylene Glycol	[illegible]	[illegible]	0.649	No	625		
1303-86-2	Boric Anhydride	[illegible]	[illegible]	0.667	No	500		
71-36-3	1-Butanol	[illegible]	[illegible]	10	No	7500		
7726-95-6	Bromine	[illegible]	[illegible]	0.047	No	35		
64-18-6	Formic Acid	[illegible]	[illegible]	0.627	No	470		
108-88-3	Toluene	[illegible]	[illegible]	25	No	18750		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	No	[illegible]		
106-88-7	1,2-Butylene Oxide	[illegible]	[illegible]	[illegible]	No	[illegible]		
7803-62-5	Silane	[illegible]	[illegible]	0.467	No	350		
107-02-8	Acrolein	[illegible]	[illegible]	0.017	No	12.5		
7803-51-2	Phosphine	[illegible]	[illegible]	0.027	No	20		
110-86-1	Pyridine	[illegible]	[illegible]	1	No	750		
1330-20-7	Xylene	[illegible]	[illegible]	29	No	21750		
78-83-1	Isobutyl Alcohol	[illegible]	[illegible]	[illegible]	No	[illegible]		
409-21-2	Silicon Carbide	[illegible]	[illegible]	0.667	No	500		
108-10-1	Methyl Isobutyl Ketone	[illegible]	[illegible]	13.7	No	10250		
75-05-8	Acetonitrile	[illegible]	[illegible]	4.47	No	3350		
108-05-4	Vinyl Acetate	[illegible]	[illegible]	2.3	No	1750		
107-41-5	2,4-Pentanediol, 2-Methyl-	[illegible]	[illegible]	[illegible]	No	[illegible]		
78-10-4	Tetraethyl Silicate	[illegible]	[illegible]	5.67	No	4250		
108-03-2	1-Nitropropane	[illegible]	[illegible]	6	No	4500		
109-60-4	Acetic Acid, Propyl Ester	[illegible]	[illegible]	56	No	42000		
1319-77-3	Cresol (Mixed Isomers)	[illegible]	[illegible]	1.47	No	1100		
109-66-0	Pentane	[illegible]	[illegible]	118	No	88500		
79-24-3	Nitroethane	[illegible]	[illegible]	20.5	No	15350		
60-29-7	Ethyl Ether	[illegible]	[illegible]	80.67	No	60500		
1309-48-4	Magnesium Oxide	[illegible]	[illegible]	0.667	No	500		
2426-08-6	N-Butyl Glycidyl Ether	[illegible]	[illegible]	9	No	6750		
34590-94-8	Dipropylene Glycol Methyl Ether	[illegible]	[illegible]	40	No	30000		
8030-30-6	Naphtha	[illegible]	[illegible]	100	No	75000		
[illegible]	[illegible]	[illegible]	[illegible]	17.93	No	[illegible]		
75-52-5	Nitromethane	[illegible]	[illegible]	3.333	No	2500		
110-82-7	Cyclohexane	[illegible]	[illegible]	70	No	52500		
75-44-5	Phosgene	[illegible]	[illegible]	0.027	No	20		
141-78-6	Ethyl Acetate	[illegible]	[illegible]	93.3	No	70000		
108-87-2	Methylcyclohexane	[illegible]	[illegible]	107	No	80500		
7440-33-7	Tungsten, [illegible]	[illegible]	[illegible]	0.333	No	250		
142-82-5	Heptane	[illegible]	[illegible]	109	No	82000		
71-55-6	1,1,1-Trichloroethane	[illegible]	[illegible]	127	No	95500		
110-19-0	Acetic Acid, 2-Methylpropyl Ester	[illegible]	[illegible]	46.7	No	35000		
100-41-4	Ethylbenzene	[illegible]	[illegible]	29	No	21750		
19287-45-7	Diborane	[illegible]	[illegible]	0.007	No	5		
79-09-4	Propionic Acid	[illegible]	[illegible]	2	No	1500		
80-62-6	Methyl Methacrylate	[illegible]	[illegible]	27.3	No	20500		
[illegible]	[illegible]	[illegible]	[illegible]	2.67	No	2000		
7782-65-2	Germanium Tetrahydride	[illegible]	[illegible]	0.04	No	30		

5/24/2006

Appendix C

Modeling Review

P-060013

MEMORANDUM

DATE: July 20, 2006

TO: Zach Klotovich, P.E., Environmental Engineer, Discipline Lead, Division of Technical Services

THROUGH: Kevin Schilling, Stationary Source Modeling Coordinator, Air Program

FROM: Darrin Mehr, Air Quality Analyst, Air Program Dm

PROJECT NUMBER: P-060013

SUBJECT: Modeling Review for Micron Technology, Inc., 15-day Permit to Construct Application for their facility in Nampa, Idaho.

1.0 Summary

Micron Technology, Inc. (Micron) submitted a 15-day Pre-Permit to Construct (PTC) application for the proposed construction of a semiconductor manufacturing facility in Nampa, Idaho. The application requests authorization to construct, install process equipment, and operate the facility under a facility emission cap (FEC) permit.

The facility's main building, three cooling towers, and three small boilers already exist at this site. A fourth boiler of 30 million British thermal units per hour (MMBtu/hr) or less and three additional cooling towers will be constructed. Process equipment will be installed at the facility for the production of semiconductor components. Emissions will be controlled by three acid scrubbers (one scrubber to remain on standby) or a VOC oxidation unit.

Air quality analyses involving atmospheric dispersion modeling of emissions associated with the facility were submitted in support of a permit application to demonstrate that the facility would not cause or significantly contribute to a violation of any ambient air quality standard (IDAPA 58.01.01.203.02).

The modeling demonstration is intended to establish a facility emissions cap (FEC) for the Micron Nampa facility. This initial modeling demonstration in part establishes a realistic worst-case ambient dispersion factor to address the analysis to determine whether changes in process emission rates or TAPs trigger the requirement to conduct a detailed modeling demonstration

An additional submittal that included a revised modeling demonstration was received by DEQ on May 24, 2006. The May 24, 2006, modeling included revised TAPs emission estimates and a TAPs analysis based on uncontrolled emissions and uncontrolled ambient impacts for process wet scrubber, FS-03, which is denoted as the process point source with the worst-case ambient impacts for the facility emission cap permit. The submittal also included revised ambient impacts for criteria air pollutants with final sizes, criteria air pollutant emission rates, and exhaust parameters for the three generators.

For additional explanation of the modeling analyses, the following sections of the permit application report should be reviewed: Section 4.1.5.3—Alternate Record keeping System—on pages 22 and 23; Section 5.3.2—Unit Emissions Modeling—on pages 34 and 35.
A technical review of the submitted air quality analyses was conducted by DEQ. The submitted modeling

analyses in combination with DEQ's staff analyses: 1) utilized appropriate methods and models; 2) was conducted using reasonably accurate or conservative model parameters and input data; 3) adhered to established DEQ guidelines for new source review dispersion modeling; 4) showed that predicted pollutant concentrations from emissions associated with the facility, when appropriately combined with background concentrations, were below applicable air quality standards at all receptor locations. Table 1 presents key assumptions and results that should be considered in the development of the permit.

Table 1. KEY ASSUMPTIONS USED IN MODELING ANALYSES

Criteria/Assumption/Result	Explanation/Consideration
All four boilers, the three process wet scrubbers, six cooling towers (with 12 vents), and the VOC abatement device (thermal oxidizer) were modeled at 8,760 hr/yr.	Micron utilized worst case operation and emission rates to predict worst-case ambient impacts.
Annual emissions for the emergency electrical generators were estimated based on 200 hours per year (hr/yr).	Ambient impacts of TAPs and criteria pollutants from each of the 3 generators were estimated.
The anemometer height was corrected to a user input value of 6.1 meters.	The 6.1 meter height is accurate for the time period during collection of the 1987-1991 meteorological data sets at the Boise airport met site.
DEQ's verification analyses predicted slightly different results for the Chi/Q values (ambient concentration in $\mu g/m^3$ divided by the modeled emission rate in lb/hr) for worst-case wet scrubber stack FS-03 which will be used in the future to evaluate process-related ambient impacts: Micron: 5.078 $\mu g/m^3$ per lb/hr of emissions, 24-hr avg, and 0.7050 $\mu g/m^3$ per lb/hr of emissions, annual avg. DEQ: 4.998 $\mu g/m^3$ per lb/hr of emissions, 24-hr avg, and 0.737 $\mu g/m^3$ per lb/hr of emissions, annual avg.	DEQ utilized meteorological files developed in-house and corrected the anemometer height to 6.1 meters. This may have caused the slight differences in Chi/Q design values for scrubber FS-03. The 24-hr avg value is 1.5% lower than that presented by Micron, and the annual avg value is 5% higher than the value presented by Micron. Scrubber FS-03 is the worst-case stack for emissions from the production processes, and all process emissions will be assumed to be emitted from this stack for future FEC permit compliance and modeling demonstrations.
All TAPs were modeled as uncontrolled emissions. Maximum ambient impacts were uncontrolled ambient impacts based on the uncontrolled emission rates.	Specific TAPs emissions limits are not required as per IDAPA 58.01.01.210.06.

2.0 Background Information

2.1 Applicable Air Quality Impact Limits and Modeling Requirements

This section identifies applicable ambient air quality limits and analyses used to demonstrate compliance.

2.1.1 Area Classification

The Micron Nampa facility is located in Canyon County, designated as an attainment or unclassifiable area for sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), lead (Pb), ozone (O_3), and particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM_{10}). There are no Class I areas within 10 kilometers of the facility.

2.1.2 Significant and Full Impact Analyses

If estimated maximum pollutant impacts to ambient air from the emissions sources at the facility exceed the significant contribution levels (SCLs) of IDAPA 58.01.01.006.90, then a full impact analysis is necessary to demonstrate compliance with IDAPA 58.01.01.203.02. A full impact analysis for attainment area pollutants involves adding ambient impacts from facility-wide emissions to DEQ-approved background concentration values that are appropriate for the criteria pollutant/averaging-time at the facility location and the area of significant impact. The resulting maximum pollutant concentrations in ambient air are then compared to the National Ambient Air Quality Standards (NAAQS) listed in Table 2. Table 2 also are then compared to the National Ambient Air Quality Standards (NAAQS) listed in Table 2. Table 2 also lists SCLs and specifies the modeled value that must be used for comparison to the NAAQS.

Table 2. CRITERIA AIR POLLUTANTS APPLICABLE REGULATORY LIMITS

Pollutant	**Averaging Period**	**Significant Contribution Levels**[a] **($\mu g/m^3$)**[b]	**Regulatory Limit**[c] **($\mu g/m^3$)**	**Modeled Value Used**[d]
PM_{10}[e]	Annual	1.0	50[f]	Maximum 1st highest[g]
	24-hour	5.0	150[h]	Maximum 6th highest[i]
Carbon monoxide (CO)	8-hour	500	10,000[j]	Maximum 2nd highest[g]
	1-hour	2,000	40,000[j]	Maximum 2nd highest[g]
Sulfur Dioxide (SO_2)	Annual	1.0	80[f]	Maximum 1st highest[g]
	24-hour	5	365[j]	Maximum 2nd highest[g]
	3-hour	25	1,300[j]	Maximum 2nd highest[g]
Nitrogen Dioxide (NO_2)	Annual	1.0	100[f]	Maximum 1st highest[g]
Lead (Pb)	Quarterly	NA	1.5[h]	Maximum 1st highest[g]

[a] IDAPA 58.01.01.006.90
[b] Micrograms per cubic meter
[c] IDAPA 58.01.01.577 for criteria pollutants
[d] The maximum 1st highest modeled value is always used for significant impact analysis
[e] Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers
[f] Never expected to be exceeded in any calendar year
[g] Concentration at any modeled receptor
[h] Never expected to be exceeded more than once in any calendar year
[i] Concentration at any modeled receptor when using five years of meteorological data
[j] Not to be exceeded more than once per year

2.1.3 TAPs Analyses

The increase in emissions from the proposed modification are required to demonstrate compliance with the toxic air pollutant (TAP) increments, with an ambient impact dispersion analysis for any TAP with a requested potential emission rate that exceeds the screening emission rate limit (EL) specified by IDAPA 58.01.01.585 or 58.01.01.586.

2.2 Background Concentrations

Ambient background concentrations were revised for all areas of Idaho by DEQ in March 2003[1]. Background concentrations in areas where no monitoring data are available were based on monitoring data from areas with similar population density, meteorology, and emissions sources. Background concentrations used in these analyses are listed in Table 3. Background concentrations for NO_2, SO_2, and CO were based on small town/suburban default values with site-specific modeled impacts from the neighboring TASCO facility added. Background PM_{10} concentrations were based on monitored values from Meridian, Idaho, with site-specific modeled impacts from TASCO added.

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[1] Hardy, Rick and Schilling, Kevin. *Background Concentrations for Use in New Source Review Dispersion Modeling.* Memorandum to Mary Anderson, March 14, 2003.

Table 3. BACKGROUND CONCENTRATIONS		
Pollutant	**Averaging Period**	**Background Concentration ($\mu g/m^3$)[a]**
PM_{10}[b]	24-hour	102
	Annual	27.1
NO_2[c]	Annual	39
Pb[d]	Quarterly	0.03
CO[e]	1-hour	13,700
	8-hour	4,300
SO_2[f]	3-hour	242
	24-hour	86
	Annual	19

[a] Micrograms per cubic meter
[b] Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers
[c] Nitrogen dioxide
[d] Lead
[e] Carbon monoxide
[f] Sulfur dioxide

3.0 Modeling Impact Assessment

3.1 Modeling Methodology

Table 4 provides a summary of the modeling parameters used in the DEQ verification analyses.

Table 4. MODELING PARAMETERS		
Parameter	**Description/ Values**	**Documentation/Additional Description**
Model	ISCST3	ISCST3, Version 02035
Meteorological data	1987-1991	Boise surface and upper air data with a minimum mixing height of 50 meters.
Land Use (urban or rural)	Rural	Rural dispersion coefficients were used by Micron based on population density data taken from LandView V software and agricultural zoning for much of the land which borders the facility.
Terrain	Considered	Receptor 3-dimensional coordinates were obtained by Geomatrix from USGS DEM files and used to establish elevation of ground level receptors. DEQ did not re-import the DEM files.
Building downwash	Downwash algorithm	Building dimensions obtained from modeling files submitted, and BPIP was used to evaluate dowawash effects.
Receptor grid	Grid 1	10 meter spacing along ambient air boundary
	Grid 2	25 meter spacing for a 1,000 meter by 1,000 meter grid centered on the facility (all nested grids were centered on the facility and receptors were deleted inside the facility's ambient air boundary)
	Grid 3	100 meter spacing for a 5,000 meter by 5,000 meter nested grid
	Grid 4	500 meter spacing for a 10,000 meter by 10,000 meter nested grid

3.1.1 Modeling protocol

A protocol was submitted by Micron to DEQ prior to submission of the application, as required by IDAPA 58.01.01.213.01.c.

Written approval of the modeling protocol, with comments on modeling methodology, was issued by Kevin Schilling, Modeling Coordinator, by letter dated February 24, 2006. Modeling was conducted using methods and data presented in the modeling protocol and the *State of Idaho Air Quality Modeling Guideline*, except where noted.

The receptor network was revised by Micron; however, it meets the Air Quality Modeling Guideline's criteria, and DEQ determined it was adequate to reasonably resolve the maximum ambient concentrations predicted by the model.

3.1.2 Model Selection

ISCST3 was used by Micron to conduct the ambient air analyses. ISCST3 is the recommended model for this instance. According to Micron's modeling analyses there were no ambient receptors located within the building and structure recirculation cavities (ISCST3 does not calculate concentrations within building recirculation cavities).

3.1.3 Meteorological Data

Boise surface and upper air meteorological data were used for the Micron site in Nampa. The anemometer height was incorrectly set at 10 meters in the application's modeling demonstration. DEQ used an anemometer height of 6.1 meters in the verification analyses.

3.1.4 Terrain Effects

The modeling analyses submitted by Micron considered elevated terrain. The actual elevation of each receptor was determined using United Geological Survey (USGS) digital elevation map (DEM) files. Elevations of emission sources, buildings, and receptors were not regenerated from DEM files for DEQ's verification analyses.

3.1.5 Facility Layout

DEQ verified proper identification of the facility boundary and buildings on the site by comparing the modeling input to a scaled USGS photograph submitted with the application. Satellite images of the site were also obtained from the Google Earth internet site to confirm the facility layout.

3.1.6 Building Downwash

Plume downwash effects caused by structures present at the facility were accounted for in the modeling analyses. The Building Profile Input Program (BPIP) was used by the applicant to calculate direction-specific building dimensions and Good Engineering Practice (GEP) stack height information from building dimensions/configurations and emissions release parameters for ISCST3.

3.1.7 Ambient Air Boundary

Ambient air was determined to exist for all areas immediately exterior to the Micron facility's property boundary. The perimeter of the property is either fenced or is posted with "no trespassing" signs spaced approximately 50 yards apart. This was approved as a sufficient boundary to demark ambient air.

3.1.8 Receptor Network

The receptor grids used by Micron met the minimum recommendations specified in the *State of Idaho Air Quality Modeling Guideline*. DEQ verification analyses were conducted using the same receptor grid.

3.2 *Emission Rates*

Emissions rates used in the dispersion modeling analyses submitted by the applicant were reviewed against those in the permit application. The following approach was used for DEQ verification modeling:

- All modeled criteria and toxic air pollutant (TAP) emissions rates were equal to or greater than the Micron facility's emissions calculated in the PTC application.
- All Chi/Q modeling runs were conducted using an emission rate of 1 lb/hr for each point of emissions.

Tables 5 and 6 list the criteria air pollutant emissions rates for sources included in the dispersion modeling analyses for short term and annual averaging periods, respectively. Daily emissions were modeled by Micron for 24 hours. Annual emissions were modeled over 8,760 hours per year.

Table 5. MODELED CRITERIA SHORT-TERM EMISSIONS RATES

Source ID	Description	Emission Rates (lb/hr[a])		
		PM_{10}[b]	SO_2[c]	CO[d]
OPERVARI[e] OPVARPM[e]	Operational variability stack[f]	2.28	1.14 (3-hr and 24-hr avgs)	4.567 (1-hr and 8-hr avgs)
BOI-01	Boiler 1	0.55	0.005	0.712
BOI-02	Boiler 2	0.55	0.005	0.712
BOI-03	Boiler 3	0.76	0.005	0.712
BOI-04	Boiler 4	0.91	0.017	2.40
GEN-01	Generator 1	0.20	0.082	11.14
GEN-02	Generator 2	0.20	0.055	7.43
GEN-03	Generator 3	0.20	0.12	16.20
VOC-01	VOC abatement device (thermal oxidizer)	0.015	0.001	0.17
FS-01	Wet scrubber No. 1 for process emissions	0.28	0	0
FS-02	Wet scrubber No. 2 for process emissions	0.28	0	0
COOL-01A	Cooling tower No. 1-Vent A	0.09	0	0
COOL-01B	Cooling tower No. 1-Vent B	0.09	0	0
COOL-02A	Cooling tower No. 2-Vent A	0.09	0	0
COOL-02B	Cooling tower No. 2-Vent B	0.09	0	0
COOL-03A	Cooling tower No. 3-Vent A	0.09	0	0
COOL-03B	Cooling tower No. 3-Vent B	0.09	0	0
COOL-04A	Cooling tower No. 4-Vent A	0.09	0	0
COOL-04B	Cooling tower No. 4-Vent B	0.09	0	0
COOL-05A	Cooling tower No. 5-Vent A	0.09	0	0
COOL-05B	Cooling tower No. 5-Vent B	0.09	0	0
COOL-06A	Cooling tower No. 6-Vent A	0.09	0	0
COOL-06B	Cooling tower No. 6-Vent B	0.09	0	0

[a] Pounds per hour
[b] Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers
[c] Sulfur dioxide
[d] Carbon monoxide
[e] OPERVARI for CO, NOx, and SO_2; OPVARPM for PM_{10}
[f] Stack is in the same location as BOI-04, and is assumed to have emissions to provide for operational variability

Table 6. MODELED CRITERIA ANNUAL EMISSIONS RATES				
Source ID	Description	Emission Rates (lb/hr[d])		
		PM$_{10}$[b]	NO$_2$[c]	SO$_2$[d]
OPERVARI[e] OPVARPM[e]	Operational variability stack	2.28	4.57	1.14
BOI-01	Boiler 1	0.064	0.71	0.005
BOI-02	Boiler 2	0.064	0.71	0.005
BOI-03	Boiler 3	0.064	0.71	0.005
BOI-04	Boiler 4	0.22	2.40	0.017
GEN-01	Generator 1	0.032	11.13	0.0019
GEN-02	Generator 2	0.022	7.42	0.0012
GEN-03	Generator 3	0.047	16.20	0.0027
VOC-01	VOC abatement device (thermal oxidizer)	0.015	0.20	0.0011
FS-01	Wet scrubber No. 1 for process emissions	0.28	0	0
FS-02	Wet scrubber No. 2 for process emissions	0.28	0	0
COOL-01A	Cooling tower No. 1-Vent A	0.09	0	0
COOL-01B	Cooling tower No. 1-Vent B	0.09	0	0
COOL-02A	Cooling tower No. 2-Vent A	0.09	0	0
COOL-02B	Cooling tower No. 2-Vent B	0.09	0	0
COOL-03A	Cooling tower No. 3-Vent A	0.09	0	0
COOL-03B	Cooling tower No. 3-Vent B	0.09	0	0
COOL-04A	Cooling tower No. 4-Vent A	0.09	0	0
COOL-04B	Cooling tower No. 4-Vent B	0.09	0	0
COOL-05A	Cooling tower No. 5-Vent A	0.09	0	0
COOL-05B	Cooling tower No. 5-Vent B	0.09	0	0
COOL-06A	Cooling tower No. 6-Vent A	0.09	0	0
COOL-06B	Cooling tower No. 6-Vent B	0.09	0	0

[a] Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers

[b] Nitrogen dioxide

[c] Sulfur dioxide

[d] Pounds per hour

[e] OPERVARI for CO, NOx, and SO$_2$; OPVARPM for PM$_{10}$

[f] Stack is in the same location as BOI-04, and is assumed to have emissions to provide for operational variability

Table 7 lists the modeled TAP emissions rates for the proposed project's combustion-related sources. The applicant also modeled the emissions from the production process stack for wet scrubber FS-03, where the process and the combustion sources emitted the same TAPs. The project, as defined in the PTC application, is subject to compliance with the TAPs increments. Daily emissions were modeled by Micron for 24 hours. Annual emissions were modeled over 8,760 hours per year.

Table 7. MODELED TOXIC AIR POLLUTANT EMISSIONS RATES

Pollutant[a]	Emissions Sources							
	BOI-01 (lb/hr)	BOI-02 (lb/hr)	BOI-03 (lb/hr)	BOI-04 (lb/hr)	GEN-01 (lb/hr)	GEN-02 (lb/hr)	GEN-03 (lb/hr)	FS-03 (lb/hr)
Carcinogenic TAPs								
Arsenic	1.70E-06	1.70E-06	1.70E-06	5.71E-06	0	0	0	0
Benzene	1.78E-05	1.78E-05	1.78E-05	6.00E-05	4.39E-04	4.39E-04	4.39E-04	7.29E-05
Formaldehyde	6.36E-04	6.36E-04	6.36E-04	2.14E-03	5.56E-04	5.56E-04	5.56E-04	4.13E-04
1,3-Butadiene	0	0	0	0	1.84E-05	1.84E-05	1.84E-05	1.37E-07
Cadmium	9.29E-06	9.29E-06	9.29E-06	3.14E-05	0	0	0	0
Chromium VI	2.13E-06	2.13E-06	2.13E-06	7.20E-06	0	0	0	0
Nickel	1.78E-05	1.78E-05	1.78E-05	6.00E-05	0	0	0	0
Non-carcinogenic TAPs								
Silica – Quartz	0	0	0	0	0	0	0	0.886
Hydrofluoric Acid	0	0	0	0	0	0	0	11.6
Ammonia	0	0	0	0	0	0	0	31.7
Hydrochloric acid	0	0	0	0	0	0	0	1.20
Sulfuric acid	0	0	0	0	0	0	0	1.19
Nitric Acid	0	0	0	0	0	0	0	0.994
Methylene Bisphenyl Isocyanate	0	0	0	0	0	0	0	0.00743
Potassium Hydroxide	0	0	0	0	0	0	0	0.271
Chlorine	0	0	0	0	0	0	0	0.275
Hydrogen Bromide	0	0	0	0	0	0	0	0.089
Diacetone Alcohol	0	0	0	0	0	0	0	21.1
Sodium Metabisulfate	0	0	0	0	0	0	0	0.392

[a] All TAPs for the combustion sources are carcinogenic TAPs regulated under IDAPA 58.01.01.586. Wet scrubber FS-03 also emits benzene, formaldehyde, and 1,3-butadiene, so this source is also included in the modeling for these TAPs.

[b] Pounds per hour

3. 3 Emission Release Parameters

Table 8 provides emissions release parameters, including stack height, stack diameter, exhaust temperature, and exhaust velocity for point sources. Values used in the analyses appeared reasonable and within expected ranges. Additional documentation /verification of these parameters was not required. Some of the exhaust release parameters were obtained from similar equipment located at the Micron facility near Boise.

Table 8. POINT SOURCE STACK PARAMETERS						
Release Point	**Release Point Description**	**Source Type**	**Stack Height (m)[a]**	**Modeled Stack Diameter (m)**	**Stack Gas Temp (K)[c]**	**Stack Gas Flow Velocity (m/sec)[d]**
OPERVARI	Operational variability stack	Point	10.97	0.91	520.93	0.001[e]
BOI-01	Boiler 1	Point	10.97	0.55	520.93	0.001[e]
BOI-02	Boiler 2	Point	10.97	0.55	520.93	0.001[e]
BOI-03	Boiler 3	Point	10.97	0.76	520.93	0.001[e]
BOI-04	Boiler 4[f]	Point	10.97	0.91	520.93	0.001[e]
GEN-01	Generator 1	Point	3.66[g]	0.20	710.37	157.52
GEN-02	Generator 2	Point	3.66[g]	0.20	710.37	157.52
GEN-03	Generator 3	Point	6.10[g]	0.20	710.37	157.52
VOC-01	Thermal oxidizer VOC emissions control unit	Point	15.24	0.36	663.71	60.39
FS-01	Wet scrubber control unit No. 1	Point	14.94	1.22	288.71	12.13
FS-02	Wet scrubber control unit No. 2	Point	14.94	1.22	288.71	12.13
FS-03	Wet scrubber control unit No. 3	Point	14.94	1.22	288.71	12.13
COOL-01	Cooling Tower No. 1 with 2 vents[h]	Point	4.88	3.05	Ambient[i]	7.75
COOL-02	Cooling Tower No. 2 with 2 vents[h]	Point	4.88	3.05	Ambient[i]	7.75
COOL-03	Cooling Tower No. 3 with 2 vents[h]	Point	4.88	3.05	Ambient[i]	7.75
COOL-04	Cooling Tower No. 4 with 2 vents[h]	Point	4.88	3.05	Ambient[i]	7.75
COOL-05	Cooling Tower No. 5 with 2 vents[h]	Point	4.88	3.05	Ambient[i]	7.75
COOL-06	Cooling Tower No. 6 with 2 vents[h]	Point	4.88	3.05	Ambient[i]	7.75

[a] Meters

[c] Kelvin

[d] Meters per second

[e] Stack equipped with a raincap

[f] Boiler 4 will be constructed in the future and will consist of boiler(s) with up to a 30 million Btus per hour (MMBtu/hr) heat input capacity

[g] Generator stack heights were all revised in the May 24, 2006 submittal

[h] Cooling Towers 1 through 6 each have 2 vents which were modeled as individual release points with the physical parameters listed above for Vent A and Vent B

[i] Modeling input is 0 Kelvin

3.4 Results for Full Impact Analyses

A significant contribution analysis was not submitted for this application. Micron submitted a full impact analysis for the proposed modification project. DEQ re-ran the modeling demonstration (for criteria pollutants and TAPs) with a revised anemometer height of 6.1 meters and the ISCST3 model. Micron used an incorrect anemometer height of 10 meters in their modeling runs, so this may account for the slightly different results. Results of DEQ's verification analyses are shown in Table 9. DEQ's results corresponded well with the ambient impacts presented by Micron. DEQ did not re-run the model for lead and annual SO_2.

Table 9. RESULTS OF FULL IMPACT ANALYSES

Pollutant	Averaging Period	Modeled Design Concentration[a] (µg/m³)[b]	Background Concentration (µg/m³)	Total Ambient Impact[a] (µg/m³)	NAAQS[c] (µg/m³)	Percent of NAAQS
PM_{10}[d]	24-hour	41 (40.2)	102	143 (142.2)	150	95% (95%)
	Annual	5 (5.2)	27.1	32.1 (32.3)	50	65% (65%)
SO_2[e]	3-hour	109 (77.4)	242	351 (319.4)	1,300	27% (25%)
	24-hour	28(21.7)	86	114 (107.7)	365	31% (30%)
	Annual	5	19.1	24.1	80	30%
CO[f]	1-hour	2,034 (1,396.4)	13,700	15,734 (15,096.4)	40,000	39% (38%)
	8-hour	689 (484.7)	4,300	4,989 (4,784.7)	10,000	50% (48%)
NO_2[g]	Annual	31 (38.3)	39	70 (77.3)	100	70% (77%)
Pb[h]	Quarterly	0.05[i]	0.0 (0.03)	0.05[i]	1.5	3%

[a] Values in parentheses were obtained from DEQ verification modeling using BPIP/ISCST3 DEQ verification design concentration for the 24-hr PM_{10} ambient standard used the highest 6th high impact. The design concentrations for the SO_2 3-hr avg and 24-hr avg , and CO 1-hr avg and 8-hr avg design concentrations utilized the highest 2nd high values.

[b] Micrograms per cubic meter

[c] National ambient air quality standards

[d] Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers

[e] Sulfur dioxide

[f] Carbon monoxide

[g] Nitrogen dioxide

[h] Lead

[i] Lead impacts were modeled as a monthly average by Micron. The results are comparable to evaluating the predicted ambient impact and the background concentration for a quarterly averaging period.

Table 10 lists the maximum predicted TAP ambient impacts for the boilers and generators. For those TAPs that were also emitted by the production process, ambient impacts were estimated using the worst-case emission rate and emissions from wet scrubber FS-03. The predicted ambient impacts presented by Micron, and the results of DEQ's verification analyses for the proposed project are listed in this table.

Predicted ambient impacts of the project's TAPs emissions did not exceed allowable increments using the uncontrolled emission rates for the process and the boilers.

Table 10. TOXIC AIR POLLUTANTS ANALYSIS RESULTS				
Pollutant	**Averaging Period**	**Maximum Concentration[a] (μg/m³)[b]**	**AAC/AACC[c] (μg/m³)**	**Percent of Limit[d]**
Benzene	Annual	0.0013	0.12	1.1%
Formaldehyde	Annual	0.01718 (0.01744)	0.077	22.3% (22.6%)
Arsenic	Annual	0.00004 (0.00004)	0.00023	17.4% (17.4%)
Cadmium	Annual	0.00023	0.00056	41.1%
Nickel	Annual	0.00045	0.0042	10.7%
1,3-Butadiene	Annual	0.00003	0.0036	0.8%
Chromium VI	Annual	0.00005	0.000083	60.2%
Silica – Quartz	24-hour	4.50	5	90%
Hydrofluoric Acid	24-hour	59.07	125	47%
Ammonia	24-hour	160.93	900	18%
Hydrochloric acid	24-hour	6.09	375	2%
Sulfuric acid	24-hour	6.06	50	12%
Nitric Acid	24-hour	5.05	250	2%
Methylene Bisphenyl Isocyanate	24-hour	0.04	2.5	2%
Potassium Hydroxide	24-hour	1.38	100	1%
Chlorine	24-hour	1.40	150	1%
Hydrogen Bromide	24-hour	0.45	500	0.1%
Diacetone Alcohol	24-hour	107.28	12,000	1%
Sodium Metabisulfate	24-hour	0.28	250	1%

[a] Values in parentheses are DEQ verification analysis results, highest 1st high for design concentrations and percentages for the percent of limit values

[b] Micrograms per cubic meter

[c] Acceptable ambient concentration (noncarcinogens)/Acceptable ambient concentration for carcinogens

[d] Non-carcinogenic TAPs solely emitted by the production process were modeled using the Chi/Q approach. Micron's noncarcinogenic TAPs impacts are approximately 1.6% higher than those predicted by DEQ verification modeling (Micron Chi/Q value / DEQ Chi/Q value is 101.6%)

4.0 Conclusions

The ambient air impact analysis submitted, in combination with DEQ's verification analyses, demonstrated to DEQ's satisfaction that emissions from the facility, as represented by the applicant in the permit application, will not cause or significantly contribute to a violation of any air quality standard.

Appendix D

MTI Comments on Draft Permit

P-060013

Micron Technology, Inc.
Comments on Draft Permit to Construct for Nampa Semiconductor Manufacturing Facility

The following are comments provided by Micron Technology, Inc (MTI) on the draft permit to construct provided to MTI on June 9, 2006 for the Nampa semiconductor manufacturing facility. Micron's comments were received by DEQ on June 30, 2006. DEQ's response is provided below each comment.

Comment 1) MTI proposes to remove Appendix A from the permit and modify the formulas in Permit Condition 4.1 so that the baseline emissions aren't subtracted from the calculated average hourly rates. MTI has reviewed the emissions estimates and determined that the flexibility provided by the condition without subtracting baseline emissions is sufficient for this site.

DEQ's Response

The proposed change was incorporated into the permit by removing Appendix A and modifying Permit Condition 4.1 so that baseline emissions are not subtracted from the calculated average hourly emissions rates.

Comment 2) General Provision 3, second bullet, reads

> The permittee shall allow the Director, and/or the authorized representative(s), upon the presentation of credentials: At reasonable times, to have access to and copy any records required to be kept under the terms and conditions of this permit, to inspect any monitoring methods required in this permit, **and require stack compliance testing in conformance with IDAPA 58.01.01.157 when deemed appropriate by the Director;**

MTI proposes to strike the highlighted section of this permit condition. The language in IDAPA 58.01.01.157 does (not) appear to reflect this permit condition. Specifically, there is not language in Section 157 that allows compliance testing when deemed appropriate by the director.

As an alternative to striking this language altogether, MTI is willing to accept the language present in MTI's Boise Tier I operating permit under General Provision 14.d. "Upon presentation of credentials, the permittee shall allow the Department or an authorized representative of the Department to do the following: As authorized by the Idaho Environmental Protection and Health Act, sample or monitor, at reasonable times, substances or parameters for the purpose of determining or ensuring compliance with this permit or applicable requirements." This condition, negotiated and agreed upon between industry, the Attorney General's Office, and DEQ, was approved by EPA during the Title V permitting process.

DEQ's Response

DEQ replaced General Provision 3 in its entirety with the language from Tier I operating permit General Provision 14.

Comment 3) The letter for the draft permit and the statement of basis state that MTI must pay the $7,500 permit processing fee prior to final permit issuance. MTI paid the processing fee concurrently with the permit application fee on March 30, 2006.

DEQ's Response

MTI did pay the $7,500 permit processing fee concurrently with the $1,000 permit application fee. DEQ received a check for $8,500 on March 30, 2006.

Comment 4) MTI found an error in the HAP calculations and has revised the Boise site facility wide HAPs emissions rates. The following table should be used in the application and statement of basis.

Year	MTI-Boise Facility-wide HAP Emissions (Tons/yr)	HAP Emitted in Greatest Quantity	MTI-Boise Greatest Individual HAP Emission (Tons/yr)
2001	12.3	Hydrofluoric Acid	4.0
2002	13.3	Hydrochloric Acid	4.0
2003	12.2	Hydrofluoric Acid	5.1
2004	17.5	2-(2-Butoxyethoxy)Ethanol	4.6
Maximum	17.5	Hydrochloric Acid	5.1
MTI-Nampa Estimate	**6.4**	**Hydrochloric Acid**	**1.9**

DEQ's Response

The HAP emissions table in the statement of basis (Table 5.2.2) was updated to reflect the table as presented in the comment.

Comment 5) MTI requests that Table 2.2 only include the total facility emissions cap (FEC) limits. The operational variability component and growth component are not emission limitations and should not be included in the emissions limits section of the permit.

DEQ's Response

The FEC emissions limits table in the permit (Table 2.2) was revised to include only the total facility emissions cap limits. Section 178 of the Rules, Standard Contents of Permits Establishing a Facility Emissions Cap, states in subsection 01., "Emissions Limitations and Standards. All permits establishing use of a FEC shall contain annual facility wide emissions limitations for each FEC pollutant." The operational variability component and growth component are not individual limitations that need to be tracked so they were removed from the permit.

Comment 6) The attached documents are track changes versions of the draft permit and Statement of Basis that contain additional minor comments. These were provided to clarify permit conditions and their intent, more accurately reflect the anticipated operations at this facility, and simplify permit conditions.

DEQ's Response

DEQ reviewed the additional proposed language changes in the permit and statement of basis and accepted or rejected the proposed changes as appropriate.

Comment 7) MTI would like an additional opportunity to comment of the permit and statement of basis before final issuance to review the response to these comments and the modeling review section that was not included in this draft.

DEQ's Response

In a phone call between Dustin Holloway (Micron) and Zach Klotovich (DEQ) on Monday, July 10, 2006, it was agreed that Micron would like to have a final permit issued as soon as possible, so rather than formally issue a second facility draft, DEQ would informally email a copy of the final permit package to Micron before the final permit begins internal DEQ review.